THE PREVENTION OF TYPHOID FEVER.

Sometimes called "Enteric Fever," "Gastric Fever," "Pythogenic Fever," "Typho-malarial Fever," and by the Germans "Abdominal Typhus."

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Typhoid fever is a common and protracted disease, terminating fatally in about one case out of eight or ten.

The number of deaths returned as having occurred in Michigan from typhoid fever averages about six hundred per year; but not all of the deaths are reported; the number of deaths which actually occur in Michigan from typhoid fever is probably more than eight hundred per year; and the number of persons in Michigan sick with typhoid fever is probably about six or eight thousand each year. A large proportion of that sickness and mortality can be and ought to be prevented.

The greatest number of deaths from this disease is of persons in the prime of life, and this should prompt to greater efforts for the prevention of the disease. Persons of all ages have the disease, and even though some have it in a mild form, yet they may be the medium of communication of the disease in a fatal form to others, for although it is not one of the most contagious diseases, **Typhoid fever is a communicable disease.**

Typhoid fever is believed to be caused by a special contagium; and the specific cause of the disease may be conveyed to persons by contact, through the air, by flies, and by drinking water contaminated by discharges from a person affected with the disease, or by leachings from the bodies of those who have died of typhoid fever. The germs permeate the entire body, and are someitmes found a considerable time after apparent recovery.

Mode of spreading or of communication.—Drinking-water contaminated with urinary or fecal discharges is believed to be the most common source or vehicle of typhoid fever. The frequent outbreaks of this disease traceable directly and unmistakably to a water-supply thus contaminated, point to this as the chief source of danger. It seems to prevail most in times of drought, in the fall of the year, especially after a period of high temperature, and when the water in wells is low, and its contaminations most concentrated. The disease has also been traced to milk diluted with infected water, and in some cases to emanations from the walls of sewers, drains and cesspools.* The typhoid bacillus is not destroyed by ordinary drying, therefore typhoid fever may be spread through the air, by the dust of dried urine or other excreta settling on bread or other foods. The bacillus is not destroyed by once freezing, but is destroyed by repeated freezing and thawing.

Filth and bad sanitary condition of premises generally, increase the danger of spreading typhoid fever. Good water-supplies, water-closets and sewers, generally restrict typhoid fever.

Protect the water-supply.—The most scrupulous care should be taken to keep the present sources of drinking-water pure, and to procure future supplies only from clean sources. The general water-supply of cities and villages is a matter of the greatest concern; it should be procured from places where there can be no probability of immediate or remote contamination. The well-known outbreak of typhoid fever at Plymouth, Pa., where over a thousand cases and 114 deaths occurred, is apparently an illustration of how great a calamity may follow the fouling of a *general* water-supply by the discharges of a person sick with typhoid fever. When there is no general water-supply, nor good sewers, much may be done to protect the wells by the abolition of cess-pits and privy-vaults, by the use of dry earth in privies, and by the frequent removal therefrom of all their contents.

*Page 1029, Vol. IX, Reference Handbook, Buck, Wm., Wood & Co., N. Y.

Great care should be taken to prevent the contamination of the water-supply by discharges from the bowels of a person sick with typhoid fever, as by drainage into wells, springs, or other water-supply, from a privy-vault, sewer, drain or cemetery. Privies often drain into wells, unsuspected by those who use the water. Should typhoid discharges pass into such a privy, an outbreak of typhoid fever among those using the water from a neighboring well would be likely to occur. If such a well were the source of the general water-supply of a city, typhoid fever might soon be epidemic there. Extraordinary care should be taken to prevent typhoid-infected discharges from entering any general water-supply from a well or small stream. The use of water from a source likely to be infected with excreta from a typhoid fever patient should be promptly stopped. Great care should be given to the milk supply.

There is good reason to suspect the water of a well whenever a vault is situated within one hundred feet of it, particularly if the soil be porous. In numerous instances fluids from excreta have leached into wells from much greater distances; and it has been proved that a well thirty rods from a cemetery received water which had filtered through the soil of the cemetery.* Dangerously contaminated water may be, and often is found to be, clear and colorless, and to have no bad taste.

Period of incubation.—The time between receiving the cause of typhoid fever into the system and becoming sick therefrom, is not uniform; but it is very often about eleven days, sometimes as long as twenty-one days.

Householders and Physicians must immediately give notice to the local health officer, of the first case, and of every case of a "disease dangerous to the public health," and typhoid fever is such, declared so by the State Board of Health. This is required by sections 1675 and 1676, Howell's Statutes, as amended by Act No. 158, Laws of 1895. If the fine is not paid, a householder may be imprisoned for disobedience of this law.†

Every case of so-called "typho-malarial fever," and every case of **fever of doubtful origin continuing more than seven days,** should be reported to the local health officer, and the same precautions taken as in other cases of typhoid fever.

Upon receipt of such notice, the local board of health has duties to perform which it is a great violation of public trust for the board to neglect or postpone. The law is very plain as to the nature and the importance of these duties. One section of the law is §1673 Howell's Statutes.

Duties of the local board of health, and of the health officer.—In order that no time may be lost, it is the duty of every board of health to make provision for prompt action by its health officer, authorizing and directing him to be prepared at all times, as executive officer of the board, to act without waiting for a meeting of the board, whenever a case of typhoid fever occurs within its jurisdiction. Some of these duties of the health officer may be briefly suggested as follows: He should—

1. Give public notice of every infected place, so that no person may unguardedly drink water or take food from a source likely to be contaminated, or in any other manner contract the disease.

2. Investigate the probable source, and manner in which the disease originated. If probably from a contaminated well or general water-supply, see that measures are taken, by boiling the water, or stopping its use, to prevent further cases being caused in the same manner.

3. Order and enforce the disinfection of all urine and discharges from the

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* Page 66. Ypsilanti Sanitary Convention, Supplement to the Annual Report of the Michigan State Board of Health, 1885.

†**Supervisors** must prosecute for all forfeitures under this law; township officers must give notice to supervisors; prosecuting attorney to conduct suit if requested; see sections 8439, 8440 and 8442, Howell's Statutes. **Health officers of villages and cities** must notify prosecuting attorney of all violations of this section—see Act No. 157, Laws of 1879, §1684, Howell's Statutes; the **prosecuting attorney** must prosecute for all such forfeitures incurred within his county.—See section 8442, Howell's Statutes.

bowels of patients sick with typhoid fever. It is safest to disinfect the discharges of all persons who have diarrhœa.*

4. Disinfect the contents of the privy on the premises, or any other that has been used by the patient.†

5. Order and secure the disinfection of all articles of clothing or bedding that have been soiled by discharges from the patient.

6. Secure the coöperation of the people in the prevention of this disease, by teaching them its mode of spread, the best methods for its prevention, and the greater importance of efforts for its prevention in times of drought and low water in wells.‡

7. Act 137, Laws of 1883 (amended by Act No. 34, Laws of 1889), specifies other duties which the health officer should perform, among which may be mentioned the disinfection of the room, and all articles likely to be infected, before allowing their use by other persons; and prompt, regular and full reports to the Secretary of the State Board of Health, as well as to the president of the local board of health.

The local board of health and the physician in charge of a case of this disease should coöperate for its restriction. The local board of health should especially guard against its spread by cases not attended by a physician. The local board is required to make and publish **regulations,** and should thus publicly require that every case of typhoid fever shall be reported to the health officer, who shall act for the restriction of the disease.¶

Personal precaution.—Do not drink water which has a bad taste or odor, or which comes from a source that renders it likely to be impure, especially if there is reason to believe that it may contain anything derived from a person sick with typhoid fever.

Disinfect the bowel discharges of the sick.—This is a measure of prime importance. The bowel discharges should, in all cases, be received upon papers or old cloths and promptly burned, or be received in vessels and at once thoroughly disinfected by thick "milk of lime," or as follows: Disinfect each discharge from the bowels by thoroughly mixing with it at least one ounce of chlorinated lime in powder, or one quart of "Standard Solution No. 1," recommended by the American Public Health Association's committee.‖ In country districts, villages and small cities, where the privy is not far distant from a well, discharges should not be thrown into a privy-vault, but, after being disinfected, they should be carried a greater distance from any source of drinking-water and then covered with earth.

Rags, closet-paper, or other similar material used about the patient, should be immediately burned.

Disinfect the urine.—The urine of typhoid patients has been found to contain large numbers of the germs of the disease. Not only the urine should be disinfected, but any shirt, garment or cloth upon which even small quantities of urine have come, should be carefully disinfected, and preferably before it has been permitted to dry so that the germs might float off as atmospheric dust.

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*Even cases so lightly sick as to be able to walk about and work are very dangerous; as in the well-known case at Caterham, England, where, in 1879, 352 cases of fever were caused, it is believed, by the diarrhœal discharges from one such workman getting into the general water-supply of the towns of Caterham and Red Hill.

†**How isolated privies may become infected** is illustrated by the case of a peddler sick with typhoid fever admitted into Bellevue Hospital, New York City, who is reported to have said that while suffering from the diarrhœa in the early stages of this disease, he had visited between forty and fifty different privies.

‡Pamphlets containing such information, issued by this State Board of Health, for distribution to neighbors of families in which there is typhoid fever, or to other persons likely to read them, may be had on application to the Secretary of the State Board of Health, at Lansing.

¶Sections 1636 and 1639, Howell's Statutes

‖"Standard Solution No. 1," is made by adding to each gallon of soft water, four ounces of chloride of lime of the best quality, which should contain at least 25 per cent of available chlorine. "Use one quart of this solution for the disinfection of each discharge in cholera, typhoid fever, etc. Mix well and leave in vessel for at least one hour before throwing into privy-vault or water-closet."

Soiled clothing, towels, bed-linen, etc., on removal from the patients should be placed in a pail or tub of zinc solution, made in proportions as follows: Water, one gallon; sulphate of zinc, four ounces; common salt, two ounces. Soiled clothing should, in all cases, be disinfected before sending away to a laundry, either by boiling for at least half an hour (it may be boiled in the zinc solution), or by soaking in a strong solution of chlorinated soda.

Bodies of those dead from typhoid fever should be wrapped in a cloth wet with a strong solution of chlorinated soda, or with "Standard Solution No. 1," or with zinc solution. The zinc solution should be made in proportions of one-half pound of chloride of zinc to one gallon of water; or, water, one gallon; sulphate of zinc, eight ounces; common salt, four ounces.

No public funeral should be held in a house where there is or has recently been a case of typhoid fever.

After a death or recovery from typhoid fever the room in which there has been a case of typhoid fever, whether fatal or not, may well, with all its contents, be thoroughly disinfected. Room disinfection by formaldehyde is fully explained in our "Teachers' Sanitary Bulletin" No. 9.—Dec., 1898.

Rooms to be disinfected must be vacated. For a room ten feet square at least three pounds of sulphur or eight ounces of formaldehyde should be used; for larger rooms proportionately increased quantities, at the rate of three pounds of sulphur or eight ounces of formaldehyde for each one thousand cubic feet of air space.

Hang up and spread out as much as possible all blankets and other articles to be disinfected; turn pockets in clothing inside out, and otherwise facilitate the access of the sulphurous or formaldehyde gas to all infected places.

Close the room tight, place the sulphur in iron pots or pans which will not leak, supported upon bricks over a sheet of zinc or in a tub containing water, so that in case melted sulphur should leak out of the pot the floor may not be burned; set the sulphur on fire by hot coals or with the aid of a spoonful of alcohol lighted by a match; be careful not to breathe the fumes of the burning sulphur, and when certain the sulphur is burning well leave the room, close the door, and allow the room to be closed for twenty-four hours.

Disinfect the privy.—It is especially important that the *contents* of the privy be disinfected. For this purpose use four ounces of the best quality of "chloride of lime" to each gallon of material in the vault.

Boil the drinking water.—Immediately on the appearance of typhoid fever a careful examination should be made of the surroundings of the house, and particularly of the source of the water used, to determine, if possible, whether it has been contaminated by leachings from a privy, or other source of filth. If the sick person has been at home, and not away where the disease might be contracted, it will be safest that water from the same source as that used by the sick person immediately before having been taken sick should not be used for drinking or culinary purposes unless it is boiled. Thorough boiling will destroy the germs of the disease. Ordinary filtering will not do so.

Isolation of the sick.—This is not always necessary if extreme care is taken, but as typhoid fever is sometimes transmitted through the air, also directly from one person to another, and indirectly by means of flies, it is wise for all who can properly do so, to keep away from the premises.

Perfect cleanliness of nurses and attendants should be enjoined and secured. As the hands of nurses may become contaminated by the poison of the disease, a good supply of towels and basins, one containing a solution of chlorinated soda,* chlorinated lime or the zinc solution, and another for plain soap and water, should always be at hand and freely used.

*To one part of Labarraque's Solution (liquor sodæ chlorinatæ) add five parts of soft water.